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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,195	08/06/2003	Ki-Nam Kim	5649-1130	8323
20792	7590	10/29/2004	EXAMINER	
MYERS BIGEL SIBLEY & SAJOVEC			GARCIA, JOANNIE A	
PO BOX 37428			ART UNIT	
RALEIGH, NC 27627			PAPER NUMBER	
			2823	

DATE MAILED: 10/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/635,195

Applicant(s)

KIM ET AL.

Examiner

Joannie A Garcia

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 20-33 is/are allowed.
- 6) ☒ Claim(s) 1-4, 7, 10, 12, 13, 15, 18 and 19 is/are rejected.
- 7) ☒ Claim(s) 5, 6, 8, 9, 11, 14, 16 and 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-4, 7, 12, 15, 18, and 19, are rejected under 35 U.S.C. 102(a) as being anticipated by Jung (U.S. Patent 6,294,805).

Regarding claims 1 and 15, Jung discloses forming a capacitor structure on a portion of a semiconductor substrate 101, the capacitor structure including a first electrode 118 on the semiconductor substrate, a capacitor dielectric 120 on the first electrode, a second electrode 124 on the dielectric, and a hard mask 126 on the second electrode (Figure 8, Column 6, lines 65-67, and Column 7, lines 13-15, 28-31, and 50-67), so that the capacitor dielectric is between the first and second electrodes (Figure 8), so that the first electrode and the capacitor dielectric are between the second electrode and the semiconductor substrate (Figure 8), and so that the first and second electrodes and the capacitor dielectric are between the hard mask and the semiconductor substrate (Figure 8), forming an oxide interlayer dielectric layer 130 on the hard mask and on portions of the semiconductor substrate surrounding the capacitor structure (Figure 8, and Column 7, lines 58-67), removing portions of the interlayer dielectric layer to expose the hard mask while maintaining portions of the interlayer dielectric layer on portions of the semiconductor substrate surrounding the capacitor structure (Figures 9 and 10, and Column 8, lines 8-13 and 25-29), and removing the hard mask thereby exposing portions of the second electrode while maintaining the portions of the interlayer dielectric layer on portions of the substrate surrounding the capacitor (Figure 10, and Column 8, lines 25-29).

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Regarding claim 2, Jung discloses, after removing the hard mask, forming a plate line 170 on the exposed portions of the second electrode (Figure 10, and Column 8, lines 29-33).

Referring to claims 3 and 4, Jung discloses forming the capacitor dielectric 120 of a ferroelectric material, such as PZT (Column 7, lines 28-31).

Regarding claim 7, Jung discloses that the interlayer dielectric 130, the hard mask 126, and the second electrode 124 comprise different materials, such as, BPSG, titanium oxide, and platinum, respectively (Figure 7, and Paragraphs 0046, and 0094).

Regarding claim 12, Jung discloses forming the first and second electrodes using platinum material.

Regarding claim 18, Jung discloses, prior to forming the capacitor structure, forming a memory cell access transistor, wherein the first electrode 118 is electrically connected to a source/drain region 103 of the memory cell access transistor (Figure 9).

Regarding claim 19, Jung discloses, prior to forming the capacitor structure, forming an insulating layer 110 on the memory cell access transistor, the insulating layer including a via 140B therein exposing a portion of the source/drain region 103 of the memory cell access transistor, and the first electrode 118 being electrically connected to the source/drain region through the via (Figure 9).

Claims 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jung as applied to claims 1-4, 7, 12, 15, 18, and 19, above, and further in view of Ying et al (US 2003/0176073 A1), and the following comments.

Jung discloses forming a ferroelectric capacitor having the capacitor dielectric layer 120 made of a titanium oxide material (Column 7, lines 58-67). Jung does not teach forming the capacitor dielectric layer 120 of a silicon nitride or titanium nitride material.

Ying et al discloses forming a ferroelectric capacitor having a capacitor dielectric layer made either using titanium nitride material or titanium oxide material (Paragraph 0007, lines 1-4). It would have been within the scope of one of ordinary skill in the art to combine the teachings of Jung and Ying et al to enable the step of forming capacitor dielectric layer 120 of Jung to be performed, by employing either of the materials disclosed by Ying et al.

Jung discloses the claimed invention except for the hard mask thickness of 50 to 200 nanometers. It would have been obvious to one having ordinary skill in the art at the time the invention was made within the teachings of Jung to determine a suitable thickness to achieve formation of capacitor dielectric 120 of Jung to be performed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In addition, the selection of the hard mask thickness, is obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215

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(CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed thickness or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen thicknesses or upon another variable recited in a claim, the Applicant must show that the chosen thicknesses are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claims 5, 6, 8, 9, 11, 14, 16, and 17, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


Claims 20-33 are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joannie García whose telephone number is (571) 272-1861. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



George Ffourson
Primary Examiner
Art Unit 2823



JAG

October 27, 2004

GFourson
Primary Examiner